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ABSTRACT

Several simulations of population, income, and employment in rural and urban America during 1970-2000 were made based on alternative assumptions. The assumptions entailed implementation of certain policies that might effect a more equal rural-urban balance by the year 2000, in addition to a continuation of current trends. If basic trends continue, rural outmigration would probably stop or reverse itself shortly after the year 2000, primarily because the gap between the incomes of rural and urban workers would have gradually closed. But the employment-population ratio in rural areas would still be below that in urban areas; hence, overall rural economic growth would still be lower. Policies to increase job opportunities and labor productivity in rural areas were judged to show more promise as development strategies than were policies to reduce the natural rate of population increase or limit outmigration. For per capita incomes and employment-population ratios in rural and urban America to be equal in the year 2000, about 8.8 million more new jobs than are expected from current trends would be needed in rural areas. Of these, 3.7 million would be transfers of jobs that would have been located in urban areas under present trends; the remaining 5.1 million jobs would have to be created to more fully utilize the underemployed rural labor force. (Author)

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RURAL-URBAN POPULATION, INCOME, and EMPLOYMENT: A SIMULATION of ALTERNATIVE FUTURES

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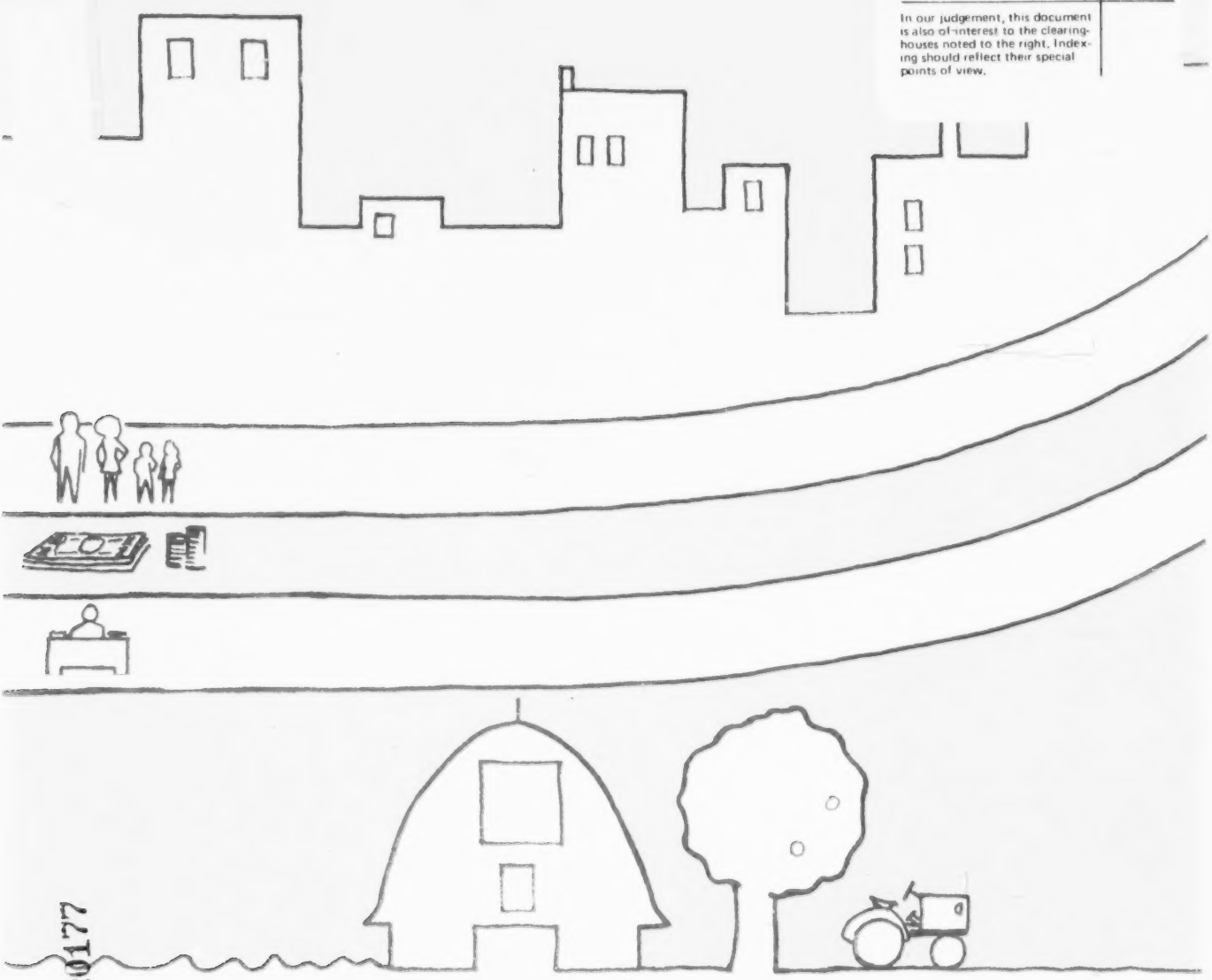

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AGRICULTURAL ECONOMIC REPORT NO. 218

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ABSTRACT

Several simulations of population, income, and employment in rural and urban America during 1970-2000 were made based on alternative assumptions. The assumptions entailed implementation of certain policies that might effect a more equal rural-urban balance by the year 2000, in addition to a continuation of current trends.

If basic trends continue, rural outmigration would probably stop or reverse itself shortly after the year 2000, primarily because the gap between the incomes of rural and urban workers would have gradually closed. But the employment-population ratio in rural areas would still be below that in urban areas; hence, overall rural economic growth would still be lower. Policies to increase job opportunities and labor productivity in rural areas were judged to show more promise as development strategies than were policies to reduce the natural rate of population increase or limit outmigration. For per capita incomes and employment-population ratios in rural and urban America to be equal in the year 2000, about 8.8 million more new jobs than are expected from current trends would be needed in rural areas. Of these, 3.7 million would be transfers of jobs that would have been located in urban areas under present trends; the remaining 5.1 million jobs would have to be created to more fully utilize the underemployed rural labor force.

Key Words: Simulation, trends, rural, urban, migration, population distribution, income, employment.

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HIGHLIGHTS

The most promising policy action for the economic development of rural America is an expansion of nonfarm job opportunities, according to results of a 50-year simulation of U.S. population, income, and employment under several alternatives. More jobs in rural areas and, to a lesser degree, increased labor productivity there, would have a greater impact than would a reduction in rural outmigration or a reduction in the rural rate of natural population increase.

A virtual doubling of the rural economy's capacity to absorb idle workers would be necessary to bring rural and urban per capita incomes and employment-population ratios into balance by the year 2000. About 8.8 million more new jobs than are expected from current trends would be needed in rural America. Of these, about 3.7 million would be transfers of jobs that would have been located in urban areas under present trends. The remaining 5.1 million jobs are not now in prospect, but would have to be created to utilize the skills of the simulation's underemployed rural labor force.

Stopping rural outmigration would increase aggregate population, income, and employment in rural America by the year 2000. But such a policy action, unless accompanied by other programs, would lead to less income and less employment on a per capita basis than can be expected from a continuation of current trends. A further shortcoming of this alternative is that total U.S. business activity would fall about 0.4 percent below trend by the year 2000.

If, in contrast to developments that would occur from new policy actions, basic trends in population, income, and employment growth continue at their present rates, rural outmigration would probably stop or reverse itself shortly after the year 2000. This would occur primarily because the gap between income per employee in rural and urban areas would have gradually closed by then. But the simulation based on current trends indicates that even though the employment-population ratio in rural areas increases by the year 2000, the ratio continues to be well below that in urban areas. This condition contributes to lower per capita incomes and slower overall economic growth in rural areas.

BASIC ECONOMIC RESEARCH AREAS OF THE UNITED STATES
CLASSIFIED AS RURAL AND URBAN, 1970
ALASKA
HAWAII
Area boundaries delineated by the Economic Research Service
Identification numbers
U. S. DEPARTMENT OF AGRICULTURE
ECONOMIC RESEARCH SERVICE
NEG. ERS 7949-71 (12)

FIGURE 1

RURAL-URBAN POPULATION, INCOME, AND EMPLOYMENT: A SIMULATION OF ALTERNATIVE FUTURES

by

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INTRODUCTION

Choices among time paths leading to alternative future levels of population, income, and employment are examined in this report as they relate to a two-sector simulation of the United States. One of the two sectors is considered to be primarily rural in character; the other, urban. The connecting link between the two sectors is migration. The purpose of this report is not only to present the analytic technique, but also to deal with an economic interpretation of the results and with implications of the model's performance and use in relating relevant national policies to rural growth.

Efforts to divide a heterogenous economy such as that of the United States into only two sectors--rural and urban--are bound to meet with varied objections on the grounds that the urban sector contains too many rural elements and/or that the rural sector is too urban. Four alternative delineations were tried for this study, none of which is entirely satisfactory. However, simulations based on all four delineations consistently lead to the same general conclusions about future prospects for the rural-urban distribution of population, income, and employment. The four delineations are discussed in the appendix, and tables there facilitate comparisons of the results of each simulation.

In the main body of the text, we treat the simulation of only one of the four delineations. A division was made of 482 multicounty planning and research areas into two groups based on their population density: 109 multicounty areas having more than 100 persons per square mile in 1970 are considered urban oriented, while 373 areas with fewer than 100 persons per square mile are considered rural oriented (fig. 1).

The method of analysis was first to measure actual 1960 and 1970 levels of population, income, and employment in each of the two sectors. An estimate of 1960-70 net migration from the rural to the urban sectors was made. Then a system of equations was determined. Parameters were estimated which, starting from 1960, permitted the computation of population, income, employment, and net migration annually for each of the two sectors and reproduced the 1970 observations in the tenth year of the simulation. The model was then run for a 50-year period, 1970-2020, to establish a basic trend. Alternative runs were compared with the basic trend run to examine the sensitivity of the system to rural-urban policies affecting natural population increase, migration, job creation, and labor productivity.

RECENT SITUATION AND PROSPECTS

In 1960, the multicounty areas comprising the rural sector accounted for about 39 percent of the U.S. population, 36 percent of the jobs, and 31 percent of the income (table 1). By 1970, the proportion of population and employment in the rural sector had declined slightly, to about 37 and 35 percent, respectively, reflecting migration to urban-oriented multicounty areas. The shares of total income changed negligibly because output per worker rose faster in the rural sector than in the urban sector during the period.

Total real personal income (in 1970 dollars) rose about 4.4 percent a year in the rural sector during the 1960's. With a gain of only 0.8 percent a year in the rural sector's population, including the impact of rural outmigration, this resulted in an average rise of 3.5 percent a year in the rural sector's income per capita--from $1,923 in 1960 to around $2,725 in 1970 (table 1). Aggregate real income rose at about the same rate in the urban sector as in the rural one; but the urban sector had a faster population increase, 1.5 percent a year, and real income per capita there rose only 2.7 percent a year. Even so, per capita income in the urban sector averaged $3,579 in 1970, around $854 higher than in the rural sector. Despite a faster percentage income growth in rural America, the income gap had widened from $797 in 1960.

If policymakers seek a more equal distribution of income between the rural and urban sectors, then a benchmark for measuring progress toward this end is apparent: Income per capita in the model's rural sector would have had to gain at a pace of 3.8 percent a year during the 1960's, instead of the 3.5 percent rate attained, to have kept the dollar gap at its 1960 size of less than $800. Growth at 6.5 percent a year would have been required to close the rural-urban disparity during the 1960's and bring about equivalent incomes within that decade.

Over the next few decades, the rate of outmigration from the more rural areas will probably continue to abate, thus bringing population growth rates in such areas closer to those in urban areas. The annual growth rate in per capita income in rural areas is likely to continue above that in urban areas. This will result in an eventual reduction of the gap between the per capita incomes of the two areas, even though the gap will probably widen further during the 1970's.

Probable consequences of alternative policies affecting the rural economy with respect to migration, natural population increase, growth in aggregate demand for jobs, and increases in productivity per worker suggest that creating jobs in and around central cities of rural-oriented multicounty areas will be of major concern in coming decades and that further attention should be directed to upgrading the quality of the labor force in such areas. However, results of the simulation suggest that overt migration and population growth policies will not need emphasis.

Summary results of alternative simulations to the year 2000 are compared with the 1960-70 trend in table 1. Details of these alternative futures are

Table 1.--Summary projections of simulated alternatives for economic development in rural and urban America, 1960-2000

Simulated alternatives	Year	Source table No. 1/	Annual population growth rate 2/		Migrants		Income per capita	
			Rural	Urban	Rural to Urban		Rural	Urban
			Percent		Thou.	Pct.	Dollars 3/	
Initial conditions	1960	2	-	-	295	.43	1,923	2,720
Initial conditions	1970	2	.85	1.51	284	.38	2,725	3,579
Trend run	2000	2	.99	1.41	130	.13	7,091	7,811
Stop rural outmigration	2000	3	1.26	1.26	0	0	6,690	8,034
Double rural outmigration inducements	2000	4	.78	1.51	165	.17	7,409	7,672
Reduce rural birth rate	2000	5	.80	1.40	100	.10	7,398	7,828
Increase rural birth rate	2000	6	1.18	1.42	159	.15	6,796	7,795
Expand rural aggregate demand for workers	2000	7	1.13	1.33	-31	-.03	8,036	7,937
Raise productivity of rural labor force	2000	8	1.04	1.38	-7	-.01	7,619	7,865
Target run	2000	9	1.26	1.26	0	0	7,811	7,811
			Distribution of--					
			Population		Employment		Income	
			Rural	Urban	Rural	Urban	Rural	Urban
			Percent					
Initial conditions	1960	2	39	61	36	64	31	69
Initial conditions	1970	2	37	63	35	65	31	69
Trend run	2000	2	34	66	32	68	32	68
Stop rural outmigration		3	37	63	32	68	33	67
Double rural outmigration inducements	2000	4	32	68	31	69	31	69
Reduce rural birth rate	2000	5	33	67	31	69	32	68
Increase rural birth rate	2000	6	36	64	32	68	32	68
Expand rural aggregate demand for workers	2000	7	36	64	36	64	36	64
Raise productivity of rural labor force	2000	8	35	65	32	68	34	66
Target run	2000	9	37	63	37	63	37	63

1/ Refers to other tables in this report. 2/ Rates are annual average rates for 1970-2000, except for row 2, where the rate is the 1960-70 average. Rates are adjusted to accommodate migration effects. 3/ Constant, 1970 dollars.

discussed in later sections of this report and illustrated in tables 2-9. In the following section, the methodology and assumptions underlying the tabular presentations are discussed.

THE MODEL

Population, income, and employment in each of the two sectors, plus net migration between sectors, are the variables used to describe the system in each year of the simulation. To remove price effects during the 1960's, the 1960 income was converted to 1970 dollars. Changes in income, employment, and population during 1960-70 were used to develop the relevant parameters for the system. That is, estimates of the economic structure were found which, through successive annual changes starting from the 1960 base, would precisely arrive at 1970 observed levels of population, income, and employment. The model was then started at 1970 and run for a 50-year simulation of the descriptive variables (table 2). Tables 3 through 8 report the results by decades for alternative 50-year runs which show how sensitive the model is in responding to exogenous changes of selected parameters in the system.

Seven equations are used in the simulation: Two each for population, income, and employment and one for net migration.

Income Growth Equations

For each sector, income in a given year was equal to the product of three terms: The annual growth in income per worker, the previous year's level of income per worker, and the current number of workers.

$$Y_{1,t+1} = (1 + b_1) \frac{(Y_{1,t})}{(E_{1,t})} (E_{1,t+1})$$

$$Y_{2,t+1} = (1 + b_2) \frac{(Y_{2,t})}{(E_{2,t})} (E_{2,t+1})$$

where Y is aggregate income of the sector, E is employment, and b reflects the annual rate of gain in labor productivity and, by implication, earnings per worker. Subscript 1 refers to the rural sector and subscript 2 to the urban sector; t and t+1 refer to successive time periods (years).

Employment Growth Equations

For each sector, employment in a given year was equal to employment in the preceding year plus the number of added workers absorbed from the nonworking population.

$$E_{1,t+1} = E_{1,t} + a_1 (P_{1,t+1} - E_{1,t})$$

$$E_{2,t+1} = E_{2,t} + a_2 (P_{2,t+1} - E_{2,t})$$

where E is employment, P is population, and a is the demand-for-labor coefficient. As defined in this study, persons not at work include those who are able to work but who have not yet joined the labor force, such as recent graduates of high schools and colleges, working-age people who have dropped out of the labor force, the unemployed, and adults who have never been in the labor force. Also, those not at work include, in this method of calculation, persons unable to work, including children, elderly people, the sick, and the structually unemployed.

Population Growth Equations

For each sector, population in a given year was equal to population in the preceding year, plus the natural increase, plus or minus migration.

$$P_{1,t+1} = (1 + c_1)\ (P_{1,t}) - M_t$$

$$P_{2,t+1} = (1 + c_2)\ (P_{2,t}) + M_t$$

where P is population, c is the annual rate of natural increase in the population, and M is migration to the urban sector from the rural sector.

Migration Equation

Migration from the rural to the urban sector is the sum of three inducements to migrate: Sector disparities in aggregate job demand, sector disparities in income per worker, and sector disparities in employment opportunities per capita.

$$M_t = d(a_2 - a_1) + e\left(\frac{Y_{2,t}}{E_{2,t}} - \frac{Y_{1,t}}{E_{1,t}}\right) + f\left(\frac{E_{2,t}}{P_{2,t}} - \frac{E_{1,t}}{P_{1,t}}\right)$$

where d is the propensity to respond to a differential in demand to absorb idle workers, e is the propensity to respond to a differential in earnings per worker, and f is the propensity to respond to a differential in participation of the population in the labor force.

Parameters

The above seven equations contain nine structural parameters for which empirical estimates are needed. The parameters were estimated by trial and error so as to reproduce 1970 data from the 1960 data for population, income, and employment.

The labor productivity coefficient for the rural sector was computed to be $b_1 = .030$, and that for the urban sector, $b_2 = .023$. A 10-percent increase in the rural coefficient was assumed for the purpose of testing the sensitivity of the model to a change in the rate of gain in output per worker in the rural sector. This is shown in Table 8.

The demand-for-labor coefficient for the rural sector was found to be $a_1 = .007$, while that for the urban sector $a_2 = .012$. The coefficients were assumed equal ($a_1 = a_2 = .012$) for the run presented in table 7 to test the model's sensitivity to an increase in the capacity of the rural sector to create jobs.

In lieu of separate population growth rates for the rural and urban sectors, the population growth coefficient for each was set to equal the overall national rate observed for 1960-70. This rate, $.0126 = c_1 = c_2$, is higher than is expected to occur over the next few decades; however, lowering the rate for both sectors would not significantly change the basic conclusions of the report. The rural sector's population growth rate was lowered to $c_1 = .0106$ in table 5 to test the sensitivity of the model to a reduced rate of natural increase in the rural sector relative to that in the urban sector. It was raised to .0146 in table 6 to test the sensitivity to a relatively larger rural rate of natural increase.

The three migration coefficients were initially set at: $d = 16{,}457$, $e = .0940$, and $f = 1901$. These settings attribute about one-half the total propensity to migrate to the differential in earnings. The other half is about equally divided between the differentials in labor demand and in employment-population ratios. These parameters were set equal to zero in table 3, while in table 4 they were doubled to test the sensitivity of the model to changes in the inducement to migrate.

MODEL IMPLEMENTATION

Simulated current trends compared with alternative simulations suggest that overt policies with respect to changes in income, population, and employment in the rural-oriented multicounty areas can expedite the closing of the gap between rural and urban development. At the same time, such policies have the potential to reduce or reverse net migration to urban-oriented places. These ends might be accomplished by gearing broad rural-urban policies on: (1) Migration, (2) the natural population increase, (3) aggregate demand for job creation, and (4) productivity per worker.

These four strategies are discussed separately below. Following the discussion is an appraisal of the optimal combination of these strategies to reach target levels of population, income, and employment for the model's rural sector. The target is geared to bring the rural sector's level of economic activity up to that of the urban sector. But first we discuss the basic trend.

Basic Trend

The 1960-70 trends for population, income, and employment in the rural and urban sectors are extrapolated by decades to the year 2020 in table 2. This establishes the basic trend used to compare alternative simulations.

TABLE 2.--SIMULATED RESULTS OF PROJECTING NORMAL TRENDS FOR RURAL AND URBAN AMERICA, 1960-2020

NATURAL POPULATION GROWTH RATE =	.012571 (RURAL)	.012571 (URBAN)	MIGRATION COEFFICIENTS:
COEFFICIENT OF DEMAND FOR EMPLOYMENT =	.007486 (RURAL)	.012195 (URBAN)	EMPLOYMENT DEMAND = 1645.00
INCOME GROWTH RATE =	.029519 (RURAL)	.022849 (URBAN)	INCOME-EMPLOYMENT RATIOS = .094000
NUMBER OF YEARS = 61			EMPLOYMENT-POPULATION RATIOS = 1900.6000

	POPULATION (THOU.)			EMPLOYMENT (THOU.)			INCOME ($MIL.)			POPULATION PROPORTION		EMPLOYMENT PROPORTION		INCOME PROPORTION	
YEAR	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
1960	179323	69393	109929	64639	23322	41316	432360	133414	298945	.3870	.6130	.3608	.6392	.3086	.6914
1970	203184	75544	127640	77265	26900	50365	662629	205838	456790	.3718	.6282	.3482	.6518	.3106	.6894
1980	230221	82694	147527	91261	30699	50561	1002719	314230	688488	.3592	.6408	.3364	.6636	.3134	.6866
1990	260855	91156	169699	106821	34787	72033	1502783	476302	1026481	.3495	.6505	.3257	.6743	.3169	.6831
2000	295566	101790	194176	124157	39252	84904	2235083	718912	1516571	.3430	.6570	.3162	.6838	.3216	.6784
2010	334896	114069	220826	143496	44218	99277	3306111	1083315	2222795	.3406	.6594	.3082	.6918	.3277	.6723
2020	379458	137182	242276	165075	49857	115217	4867468	1633910	3233557	.3431	.6569	.3020	.6980	.3357	.6643

YEAR	MIGRATION RURAL-TO-URBAN THOU.	MIGRATION RURAL-TO-URBAN PERCENT	EMPLOYMENT PER 1000 POP. TOTAL	EMPLOYMENT PER 1000 POP. RURAL	EMPLOYMENT PER 1000 POP. URBAN	INCOME PER CAPITA TOTAL	INCOME PER CAPITA RURAL	INCOME PER CAPITA URBAN	INCOME PER EMPLOYEE TOTAL	INCOME PER EMPLOYEE RURAL	INCOME PER EMPLOYEE URBAN
1960	295	.4258	360.5	336.1	375.8	2411.6	1923.1	2719.9	6689.3	5720.9	7236.0
1970	284	.3759	380.3	356.1	394.6	3261.7	2725.2	3579.2	8576.5	7652.4	9070.0
1980	259	.3127	396.4	371.2	410.5	4356.0	3800.4	4667.4	10987.9	10236.1	11368.9
1990	211	.2319	409.5	381.6	424.5	5761.5	5225.6	6049.3	14068.7	13692.3	14250.5
2000	130	.1284	420.1	387.1	437.3	7563.9	7091.0	7810.8	18005.7	18315.4	17862.5
2010	-2	-.0027	428.5	387.6	449.6	9872.6	9497.5	10066.3	23040.1	24499.5	22390.1
2020	-213	-.1646	435.0	383.0	462.2	12827.9	12551.4	12972.3	29486.8	32771.8	28065.3

The rate of natural increase in population is set at 1.26 percent a year for both sectors. This results in a U.S. population estimate of nearly 296 million persons in the year 2000, which is midway between the Series C and D projections of the Bureau of the Census.

Trends of the 1960's point to continued abatement of outmigration from rural-oriented multicounty areas during coming decades. The principal explanation for this in the model is the faster rate of gain in income per employee in the rural sector (2.95 percent a year) than in the urban sector (2.28 percent a year). This trend closes the gap between income per employee in the rural and urban sectors around the year 1996, thus removing one of the main inducements in the model for migrating.

The capacity of the labor market in the model's rural sector to absorb workers is about 60 percent of that of the urban sector (.0075 new jobs per idle rural person compared with .0122 new jobs per idle urbanite). Consequently, even though the employment-population ratio rises in the rural sector--from 356 workers per 1,000 population in 1970 to 387 workers in the year 2000--it continues to be well below that of the urban sector. This lower ratio will be seen later in this report to be one of the primary variables explaining lower income per capita and slower growth in the rural sector.

The basic trend run generates projections of population, income, and employment for the rural and urban-oriented areas which appear reasonable. However, the reasonableness does not always extend to the full 50 years of the simulation. For example, the number of persons employed per 1,000 population in the rural-oriented areas begins to decline past the year 2000. This is inherent in the system of equations: Potential outmigrants are staying in the rural sector because the income-per-employee gap has about closed; but they are not finding jobs because the capacity of the rural sector to absorb workers is assumed unchanged. That is, after the year 2000, unemployment is indicated as rising in the rural sector. We feel that this is a weakness in the model rather than a forecast of future conditions. Consequently, most of the interpretations in what follows are based on the 1970-2000 segment of the projections.

The projections are based on a purposely simple, seven-equation system; consequently, they do not include information on many aspects of the rural-urban balance problem. For example, we say nothing about capital flows between the two sectors or about exchange of goods and services. There is no recognition of the role of race in migration. No consideration is given to the fact that gross fertility rates in rural areas would be expected to rise as outmigration of females of childbearing age decreases. Also, no more than the two broad sectors are analyzed. These and other aspects of the problem may be taken up in subsequent extensions of the basic model that would include more than just seven equations. In what follows, we seek to see what the simple model can tell us about alternative future prospects for rural and urban population, income, and employment.

Migration Effects

The Nation's migration pattern of the past two decades resulted in large geographic regions with population declines. These regions tended to contain

the more sparsely populated rural areas. Two net migration patterns emerge: One is a movement from rural to nearby urban places within a rural area; the other is a net movement from rural to urban areas. It is the latter movement, from rural areas to urban ones, that is the focus of the migration analysis in this report.

To assist rural as well as other migrants, Federal manpower programs provide direct financial assistance to the unemployed and underemployed for travel and initial subsistance while they wait for the first paycheck in a new job location. Usually, migration and relocation programs are coupled with education and retraining programs, which will be discussed later in this report in the section on increasing output per worker.

In this section, however, we treat only the notion sometimes put forward that directly stopping rural outmigration, or perhaps reversing it, is a means to rural development. The implication is apparently that reduced population flows will provide a larger, more productive labor force in rural areas, and at the same time, ease population pressures on the cities.

Consequences of stopping outmigration from the rural-oriented multicounty areas were appraised with the simulation model by setting the migration coefficients equal to zero and then comparing the results of a 50-year period with no migration with the basic trend established in table 2. The simulation with no migration is presented in table 3. Table 10 shows that zero outmigration from the rural sector adds about 8.5 million people, above trend, to the rural sector by the year 2000. Zero net outmigration has the same effect on the rural sector's population as does the target simulation to be discussed later. However, it is estimated that only about 10 percent of these additional persons will find employment unless concurrent efforts are made to create additional jobs. Without an accompanying job policy, the employment-population ratio is projected to fall to below 37 percent of the population, compared with 39 percent in the trend run. Per capita income, as a result, falls more than $400 below what is expected under current trends. Per capita income in the urban sector, on the other hand, rises nearly $225 above trend as a consequence of less unemployment there and reduced competition for jobs. Stopping outmigration brings about increases in aggregate population, income, and employment in rural America, but unless accompanied by other programs, will lead to less real income per capita and less jobs per 1,000 population in the rural areas than can be expected allowing current trends to prevail.

If such a reduction in migration adds to problems of unemployment and low income in rural areas, will increasing outmigration lessen these pressures? The consequences of doubling the response to inducements to migrate are simulated by doubling the three migration coefficients in the model (table 4). This action reduces the population growth rate in the rural sector during 1970-2000 to .8 percent a year, from the 1970-2000 trend run of 1.0 percent (table 1). By the year 2000, unemployment problems are considerably reduced in the rural sector and the employment-population ratio there rises above trend, from 39 to 40 percent. Also, by the year 2000, per capita income in the rural sector runs nearly $320 above trend, although continuing below the average of the urban sector. These apparent benefits are slow in coming; also, they come

TABLE 3.--SIMULATED RESULTS OF STOPPING OUTMIGRATION FROM RURAL TO URBAN AMERICA, 1970-2020

NATURAL POPULATION GROWTH RATE = .012571 (RURAL) .012571 (URBAN) MIGRATION COEFFICIENTS:
COEFFICIENT OF DEMAND FOR EMPLOYMENT = .007485 (RURAL) .012195 (URBAN) EMPLOYMENT DEMAND= .00
INCOME GROWTH RATE= .029519 (RURAL) .022849 (URBAN) INCOME-EMPLOYMENT RATIOS= .000000
NUMBER OF YEARS= 51 EMPLOYMENT-POPULATION RATIOS= .0000

YEAR	POPULATION (THOU.)			EMPLOYMENT (THOU.)			INCOME ($MIL.)			POPULATION PROPORTION		EMPLOYMENT PROPORTION		INCOME	
	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
1970	203184	75544	127640	77265	26900	50365	662629	205838	456791	.3718	.6282	.3482	.6518	.3106	.6894
1980	233221	85596	147625	91201	30795	60406	1001935	315217	686723	.3671	.6329	.3377	.6623	.3146	.6854
1990	260455	96986	163469	106583	35186	71397	1499178	481763	1017414	.3723	.6277	.3301	.6699	.3212	.6788
2000	295566	109891	185674	123650	40140	83510	2226824	735162	1491661	.3719	.6281	.3246	.6754	.3301	.6699
2010	334896	124518	210381	142666	45733	96932	3290718	1120426	2170292	.3718	.6282	.3206	.6794	.3405	.6595
2020	379458	141082	238376	163927	52052	111875	4845594	1705833	3139754	.3718	.6282	.3175	.6825	.3520	.6480

YEAR	MIGRATION RURAL-TO-URBAN THOU.	MIGRATION RURAL-TO-URBAN PERCENT	EMPLOYMENT PER 1000 POP. TOTAL	EMPLOYMENT PER 1000 POP. RURAL	EMPLOYMENT PER 1000 POP. URBAN	INCOME PER CAPITA TOTAL	INCOME PER CAPITA RURAL	INCOME PER CAPITA URBAN	INCOME PER EMPLOYEE TOTAL	INCOME PER EMPLOYEE RURAL	INCOME PER EMPLOYEE URBAN
1970	0	.0000	380.3	356.1	398.6	3261.7	2725.3	3579.2	8575.5	7652.9	9030.0
1980	0	.0000	395.1	359.8	417.7	4352.5	3683.0	4749.9	10986.9	10236.1	11368.9
1990	0	.0000	408.6	362.8	435.7	5747.7	4967.9	6203.2	14066.2	13692.3	14250.5
2000	0	.0000	418.4	365.3	449.9	7534.6	6690.4	8034.2	18009.6	18315.9	17862.5
2010	0	.0000	426.0	367.3	460.7	9826.5	8999.9	10316.5	23066.3	24499.5	22390.1
2020	0	.0000	432.0	369.0	469.3	12770.2	12091.6	13171.9	29559.8	32771.8	28065.3

TABLE 4.--SIMULATED RESULTS OF DOUBLING THE RATE OF OUTMIGRATION FROM RURAL TO URBAN AMERICA, 1970-2020

NATURAL POPULATION GROWTH RATE =	.012571 (RURAL)	.012571 (URBAN)	MIGRATION COEFFICIENTS:
COEFFICIENT OF DEMAND FOR EMPLOYMENT =	.007485 (RURAL)	.012195 (URBAN)	EMPLOYMENT DEMANDS = 3291.400
INCOME GROWTH RATE =	.029519 (RURAL)	.022849 (URBAN)	INCOME-EMPLOYMENT RATIOS = .188000
NUMBER OF YEARS = 51			EMPLOYMENT-POPULATION RATIOS = 3801.2000

	POPULATION (THOU.)			EMPLOYMENT (THOU.)			INCOME ($MIL.)			POPULATION PROPORTION		EMPLOYMENT PROPORTION		INCOME	
YEAR	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
1970	203184	75544	127640	77265	26900	50365	662629	205838	456791	.3718	.6282	.3482	.6518	.3106	.6894
1980	230221	80125	150095	91316	30610	60705	1003446	313319	690127	.3480	.6520	.3352	.6648	.3122	.6878
1990	260855	86544	174311	107023	34446	72577	1505859	471629	1034229	.3318	.6682	.3219	.6781	.3132	.6868
2000	295566	95286	200279	124558	38546	86012	2242332	705966	1536365	.3224	.6776	.3095	.6905	.3148	.6852
2010	334896	107777	227118	144108	43083	101020	3317435	1055624	2261811	.3203	.6797	.2990	.7010	.3182	.6818
2020	379458	124038	255420	165861	48324	117536	4882314	1583666	3298647	.3269	.6731	.2914	.7086	.3244	.6756

	MIGRATION		EMPLOYMENT PER 1000 POP.			INCOME PER CAPITA			INCOME PER EMPLOYEE		
YEAR	RURAL-TO-URBAN THOU.	RURAL-TO-URBAN PERCENT	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN
1970	568	.7517	380.3	356.1	398.6	3261.7	2725.2	3579.2	8576.5	7652.4	9070.0
1980	453	.5956	396.6	382.0	404.4	4359.1	3910.9	4598.9	10989.2	10236.1	11368.9
1990	330	.3810	410.3	398.0	416.4	5773.3	5450.1	5933.7	14070.8	13692.3	14250.5
2000	165	.1728	421.4	404.5	429.5	7587.1	7409.3	7671.6	18002.7	18315.4	17862.5
2010	-80	-.0758	430.3	401.7	443.8	9906.4	9840.6	9937.4	23020.8	24499.5	22390.1
2020	-961	-.3721	437.1	389.6	460.2	12867.0	12768.1	12915.1	29436.6	32771.8	28069.3

at the expense of slowing down the growth rate in general business activity in the rural sector and of exporting some unemployment problems to the urban sector. More importantly, these changes are not sufficient to close the development gap.

The inference with respect to migration policies is this: It is apparent that reduced outmigration raises aggregate income and employment in the rural areas; and that increased outmigration enhances rural income and employment on a per capita basis. Apparently manipulating migration rates alone is not an effective means of attaining either income or employment targets. Migration policies can be important in reaching population distribution targets, but only in conjunction with comprehensive and relevant programs designed to reach employment and income targets in both the rural and urban sectors.

Population Growth Rate Effects

The population explosion is often blamed for impeding progress toward achievement of development goals. It is sometimes suggested that reduced rates of natural population increase in depressed areas will ease the pressures of population growth on the social and economic system and allow for a more complete assimilation of low-income people into the productive labor force. Family planning services are provided by the Government to low-income persons living in areas of intense poverty. Table 5 shows the effect of lowering the rate of natural population increase to 1.06 percent a year in the rural-oriented multicounty areas from the 1.26-percent rate used in preparing table 2. This reduction slows the rural sector's rate of population increase to approximately 0.8 percent a year and, with reduced outmigration, it also reduces slightly the rate of population increase in the urban sector (table 1). With a decline in the total number of persons unemployed in the rural sector, income per capita there rises as the family planners suggest. By the year 2000, it is over $300 above trend. However, the per capita gains are realized at the expense of reduced total U.S. business activity, down about 0.5 percent below trend by the year 2000. This is consistent with the popularly held belief that larger populations may lead to increased national income.

Were the natural rate of population growth in rural areas to increase rather than decrease, an increase in total business activity would be realized at the expense of a deterioration in the rate of improvement in income per capita. Table 6 shows the consequences of stepping up the rate of natural increase in the rural sector to 1.46 percent a year, without simultaneously expanding the local economies' ability to absorb workers. A 0.5-percent larger total U.S. economy in the year 2000 is associated with a level of rural income per capita around $300 below trend.

The conclusion with respect to population growth policies is this: If one were forced to make a choice between increasing net outmigration versus reducing the rate of natural population increase as a means of improving per capita income in rural America, the latter appears preferable. However, neither approach is very efficient or satisfactory. Each might prove useful as minor adjuncts to comprehensive employment and income policies, but alone they will not be effective in solving the rural area development problem.

TABLE 5.--SIMULATED RESULTS OF REDUCING THE NATURAL RATE OF POPULATION INCREASE IN RURAL AMERICA, 1970-2020

NATURAL POPULATION GROWTH RATE = .010571 (RURAL) .012571 (URBAN)
COEFFICIENT OF DEMAND FOR EMPLOYMENT= .007486 5 (RURAL) .012195 7 (URBAN)
INCOME GROWTH RATE= .029519 3 (RURAL) .022849 1 (URBAN)
NUMBER OF YEARS= 51

MIGRATION COEFFICIENTS:
EMPLOYMENT DEMAND= 16457.00
INCOME-EMPLOYMENT RATIOS= .0940000
EMPLOYMENT-POPULATION RATIOS= 1900.6000

	POPULATION (THOU.)			EMPLOYMENT (THOU.)			INCOME ($MIL.)			POPULATION PROPORTION		EMPLOYMENT PROPORTION		INCOME PROPORTION	
YEAR	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
1970	203184	75544	127640	77265	26900	50365	662629	205838	456791	.3718	.6282	.3482	.6518	.3106	.6894
1980	228572	81104	147468	91207	30647	60559	1002167	313699	688467	.3548	.6452	.3360	.6640	.3130	.6870
1990	257210	87756	169453	106580	34564	72016	1499482	473249	1026233	.3412	.6588	.3243	.6757	.3156	.6844
2000	289505	95882	193623	123574	38729	84845	2224835	709329	1515505	.3312	.6688	.3134	.6866	.3188	.6812
2010	325908	106054	219853	142389	43250	99138	3279275	1059595	2219679	.3254	.6746	.3037	.6963	.3231	.6769
2020	366913	119135	247778	163230	48277	114952	4808245	1582110	3226134	.3247	.6753	.2958	.7042	.3290	.6710

YEAR	MIGRATION RURAL-TO-URBAN THOU.	MIGRATION RURAL-TO-URBAN PERCENT	EMPLOYMENT PER 1000 POP. TOTAL	EMPLOYMENT PER 1000 POP. RURAL	EMPLOYMENT PER 1000 POP. URBAN	INCOME PER CAPITA TOTAL	INCOME PER CAPITA RURAL	INCOME PER CAPITA URBAN	INCOME PER EMPLOYEE TOTAL	INCOME PER EMPLOYEE RURAL	INCOME PER EMPLOYEE URBAN
1970	284	.3758	380.3	356.1	394.8	3261.7	2725.2	3579.2	8576.5	7652.4	9070.0
1980	246	.3037	399.0	377.9	410.7	4385.0	3868.4	4669.1	10988.3	10236.1	11368.9
1990	189	.2155	414.4	393.9	425.0	5830.3	5393.2	6056.5	14069.5	13692.3	14250.5
2000	100	.1044	426.8	403.9	438.2	7685.5	7398.4	7827.6	18004.5	18315.4	17862.5
2010	-38	-.0356	436.9	407.8	450.9	10062.5	9991.5	10096.7	23030.9	24499.5	22390.1
2020	-252	-.2176	448.9	405.2	463.9	13105.1	13280.4	13020.8	29457.3	32771.8	28065.3

TABLE 6.--SIMULATED RESULTS OF INCREASING THE NATURAL RATE OF POPULATION INCREASE IN RURAL AMERICA, 1970-2020

NATURAL POPULATION GROWTH RATE = .014571 (RURAL) .012571 (URBAN) MIGRATION COEFFICIENTS:
COEFFICIENT OF DEMAND FOR EMPLOYMENT= .007485 (RURAL) .012195 (URBAN) EMPLOYMENT DEMAND= 1645.00
INCOME GROWTH RATE= .029519 (RURAL) .022849 (URBAN) INCOME-EMPLOYMENT RATIOS= .094000
NUMBER OF YEARS= 51 EMPLOYMENT-POPULATION RATIOS= 1900 .6000

	POPULATION (THOU.)			EMPLOYMENT (THOU.)			INCOME ($MIL.)			POPULATION PROPORTION		EMPLOYMENT PROPORTION		INCOME	
YEAR	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
1970	203184	75544	127640	77265	26900	50365	662629	205838	456791	.3718	.6282	.3482	.6518	.3106	.6894
1980	231900	84313	147586	91315	30752	60563	1003278	314766	688511	.3636	.6364	.3368	.6632	.3137	.6863
1990	264636	94695	169940	107067	35016	72051	1506161	479432	1026729	.3578	.6422	.3270	.6730	.3183	.6817
2000	301967	107253	194713	124761	39797	84963	2246511	726894	1517616	.3552	.6448	.3190	.6810	.3245	.6755
2010	344557	122790	221766	144657	45243	99413	3334260	1108431	2225828	.3564	.6436	.3128	.6872	.3324	.6676
2020	393180	142462	250717	167032	51559	115473	4930413	1689667	3240746	.3623	.6377	.3087	.6913	.3427	.6573

YEAR	MIGRATION RURAL-TO-URBAN THOU.	MIGRATION RURAL-TO-URBAN PERCENT	EMPLOYMENT PER 1000 POP. TOTAL	EMPLOYMENT PER 1000 POP. RURAL	EMPLOYMENT PER 1000 POP. URBAN	INCOME PER CAPITA TOTAL	INCOME PER CAPITA RURAL	INCOME PER CAPITA URBAN	INCOME PER EMPLOYEE TOTAL	INCOME PER EMPLOYEE RURAL	INCOME PER EMPLOYEE URBAN
1970	284	.3758	380.3	356.1	394.6	3261.7	2725.2	3579.2	8576.5	7652.4	9070.0
1980	271	.3211	393.8	364.7	410.4	4326.8	3733.8	4665.6	10987.4	10236.1	11368.9
1990	233	.2460	404.6	369.8	424.0	5691.9	5063.4	6042.2	14067.9	13692.3	14250.5
2000	159	.1493	413.2	371.1	436.4	7440.1	6796.5	7794.6	18007.0	18315.4	17862.5
2010	31	.0252	419.8	368.5	448.3	9677.4	9027.5	10037.3	23049.9	24499.5	22390.1
2020	-176	-.1245	424.8	361.9	460.6	12540.3	11860.9	12926.4	29518.1	32771.8	28065.3

Expanded Demand for Workers

The solution to income and employment problems fashionable with economists over the last 30 years has been to expand aggregate demand for workers. Efforts to expand the capacity of the rural economy to create new jobs would help close the economic gap between rural and urban America. The Government provides information on alternative plant sites to industries seeking new locations. It also provides information on potentially available industries to local planning groups. In addition, some programs are available and others are under consideration to provide tax relief to plants moving into rural areas. Even more direct in creating new jobs would be wage supplements or subsidies. Direct controls on capital movements are used, including restrictions on industrial expansion in congested areas. One of the strongest counterattacks to private capital flows into congested areas is a conscious counterflow of public funds into uncongested areas.

Other programs provide loans to small business concerns for expanding or continuing current operations and to promote local economic growth. Sometimes these loans are coupled with technical or planning assistance. Programs of this nature expand aggregate demand for jobs for persons who might otherwise be unemployed and, in rural areas, for persons who might migrate to urban areas in search of employment.

During 1960-70, the urban-oriented multicounty areas were able to provide close to twice as many new jobs per 1,000 people not at work (12 jobs a year) as the rural areas (7.5 jobs a year). In one phase of the simulation, the capacity of the rural sector to create new jobs is increased to match that of the urban sector--the demand-for-employment coefficient was changed from .007 (trend) to .012. As a result, per capita income in the model's rural sector rises sufficiently to exceed that of the urban sector by the year 2000 (table 7). The employment-population ratio in the rural sector rises from the current level of 36 percent of the population to a level close to the urban sector average (44 percent) in 30 years, according to the simulation. With more jobs and more income per capita in the rural sector, the rate of outmigration is slowed during the next few decades, with a reversal indicated before the year 2000. These changes stimulate total business activity in the rural sector by over 18 percent above trend by the year 2000. At that point, the gap between the level of economic development in the rural and the urban sectors closes, as suggested by the rural sector's higher per capita income and a reversal of the migration trend. At the same time, population pressures on major cities are eased because there are about 4.5 million fewer residents and 0.6 million fewer jobs in the urban sector (table 10).

Increased Labor Productivity

Raising productivity per employee in rural areas represents an effort to solve the development problem from the point of view of the quality of utilization of labor. This is in contrast to the approach discussed above, where the quantity of workers is increased without any enhancement in the efficiency of the workers.

TABLE 7.SIMULATED RESULTS OF EXPANDING AGGREGATE DEMAND FOR JOBS IN RURAL AMERICA TO THE LEVEL IN URBAN AMERICA, 1970-2020

NATURAL POPULATION GROWTH RATE = .012571 0(RURAL) .012571 0(URBAN)
COEFFICIENT OF DEMAND FOR EMPLOYMENT= .012195 7(RURAL) .012195 7(URBAN)
INCOME GROWTH RATE= .029519 3(RURAL) .022849 1(URBAN)
NUMBER OF YEARS= 51

MIGRATION COEFFICIENTS:
EMPLOYMENT DEMAND= 16457.00
INCOME-EMPLOYMENT RATIOS= .0990000
EMPLOYMENT-POPULATION RATIOS= 19.00 .6000

	POPULATION(THOU.)			EMPLOYMENT(THOU.)			INCOME($MIL.)			POPULATION PROPORTION		EMPLOYMENT PROPORTION		INCOME	
YEAR	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
1970	203184	75544	127640	77265	26900	50365	662629	205838	456791	.3718	.6282	.3482	.6518	.3106	.6894
1980	230221	83709	146511	93525	33013	60511	1025838	337913	687924	.3636	.6364	.3530	.6470	.3294	.6706
1990	260855	93675	167179	111259	39465	71794	1563415	540348	1023067	.3591	.6409	.3547	.6453	.3456	.6544
2000	295566	105855	189710	130742	46446	84296	2356367	850655	1505711	.3581	.6419	.3552	.6448	.3610	.6390
2010	334896	120911	213984	152278	54185	98092	3523757	1327497	2196260	.3610	.6390	.3558	.6442	.3767	.6233
2020	379458	139845	239613	176200	62980	113219	5241455	2063971	3177484	.3685	.6315	.3574	.6426	.3938	.6062

	MIGRATION		EMPLOYMENT PER 1000 POP.			INCOME PER CAPITA			INCOME PER EMPLOYEE		
YEAR	RURAL-TO-URBAN THOU.	PERCENT	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN
1970	206	.2733	380.3	356.1	394.6	3261.7	2725.2	3579.2	8576.5	7652.4	9070.0
1980	142	.1695	406.2	394.4	413.0	4456.4	4037.2	4695.9	10969.1	10236.1	11368.9
1990	68	.0725	426.5	421.3	429.4	5993.9	5768.8	6127.1	14052.5	13692.3	14250.5
2000	-31	-.0302	442.3	438.8	444.3	7972.9	8036.5	7937.4	18023.4	18315.4	17862.5
2010	-179	-.1478	454.7	446.1	458.4	10522.4	10979.5	10264.2	23140.7	24699.5	22390.1
2020	-399	-.2853	464.3	450.4	472.5	13813.5	14759.5	13261.3	29747.6	32771.8	28065.3

Efforts to raise income and output per worker in rural areas promise substantial returns and appear to be worth the extra effort. Implementation of this approach necessitates significant changes in health care, education, job training, family location, commuting patterns, central city services, and other factors related to people. This approach, in effect, requires reducing the high rate of underemployment in the rural economy as well as increasing the capacity of each worker to produce. Both the job and the worker need upgrading.

A number of Government programs assist communities in raising the general educational level of the population as well as in upgrading the skills of the labor force through job training and placement services. They include educational extension services to businessmen to provide technical assistance in adopting new technologies to increase the productivity of their labor force. So far, it appears that little heed has been paid to the rural-urban consequences of these programs; they have been used more to help low-income urban people find productive urban employment than to influence the rural-urban distribution of employment.

Table 8 depicts the impact of raising the rate of growth in income per worker in the rural-oriented multicounty areas, where income per worker is lower. To examine the consequences of increased productivity and earnings in the model's rural sector, the productivity growth coefficient was raised from 2.95 percent a year to 3.25 percent. For the urban sector, the coefficient remained at 2.28 percent. Three heartening results evolve from pursuit of this policy: First, aggregate income, employment, and population in the rural sector rise above the trend line. Because of improved income per worker in the rural sector, a substantial rise in total business activity occurs. Second, outmigration from the rural sector stops in less than 30 years. Before the year 2000, net migration to the rural sector occurs, with former urban-sector residents joining the rural sector's productive labor force and sharing in its higher economic rewards. The third result of this policy action is that the gap in per capita incomes between the rural and urban sectors immediately begins to close, and within 40 years, per capita income in the rural sector exceeds that in the urban sector.

Target Run and Conclusions

In the preceding sections, alternative migration, population, job creation, and labor productivity policies were examined for their possible long-range effect on rural development. Policies of increased demand for workers and increased labor productivity were judged to have a more positive and relevant impact than changes in migration and population growth. To assess the relative importance of the job creation versus labor productivity impacts, parameters were estimated which would provide an optimal mix of these two policies in reaching specific population, income, and employment targets by the year 2000.

The targets were set as follows: Total U.S. population was allowed to grow to the year 2000 at 1960-70 rates, with the rural-urban distribution held at the 1970 proportion for the two areas. Income targets for the year 2000 were geared to have income per capita in the rural sector equal to the trend projection for the urban sector, $7,811 (table 2). The time path over which

TABLE 8.--SIMULATED RESULTS OF INCREASING THE TREND INCOME GROWTH RATE IN RURAL AMERICA BY 10 PERCENT, 1970-2020

NATURAL POPULATION GROWTH RATE =	.012571 0(RURAL)	.012571 0(URBAN)	MIGRATION COEFFICIENTS:
COEFFICIENT OF DEMAND FOR EMPLOYMENT =	.007486 5(RURAL)	.012135 7(URBAN)	EMPLOYMENT DEMAND= 1645 7.00
INCOME GROWTH RATE=	.032471 2(RURAL)	.022849 1(URBAN)	INCOME-EMPLOYMENT RATIOS = .0940000
NUMBER OF YEARS= 51			EMPLOYMENT-POPULATION RATIOS= 1900 .6000

	POPULATION(THOU.)			EMPLOYMENT(THOU.)			INCOME($MIL.)			POPULATION PROPORTION		EMPLOYMENT PROPORTION		INCOME	
YEAR	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
1970	203184	75544	127640	77265	26902	50365	662629	205838	456791	.3718	.6282	.3482	.6519	.3106	.6894
1980	230221	82806	147415	91259	30701	60558	1011829	323373	688456	.3597	.6403	.3364	.6636	.3196	.6804
1990	260855	91745	169110	106907	34810	71996	1530659	504708	1025951	.3517	.6483	.3259	.6741	.3297	.6703
2000	295566	103083	192482	124100	39749	84751	2299142	785315	1513826	.3488	.6512	.3171	.6829	.3416	.6584
2010	334996	117921	216975	143335	44995	98340	3435366	1222373	2212993	.3521	.6479	.3104	.6896	.3558	.6442
2020	379458	137518	241940	164702	50512	114190	5114364	1910131	3204232	.3635	.6365	.3067	.6933	.3734	.6266

	MIGRATION		EMPLOYMENT PER 1000 POP.			INCOME PER CAPITA			INCOME PER EMPLOYEE		
YEAR	RURAL-TO-URBAN THOU.	PERCENT	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN
1970	284	.3758	380.3	356.1	394.6	3261.7	2725.2	3579.2	8576.5	7652.4	9070.0
1980	232	.2803	396.4	370.8	410.8	4395.5	3905.8	4670.6	11087.8	10533.4	11368.9
1990	142	.1548	409.4	379.4	425.7	5868.3	5501.7	6067.3	14331.6	14499.2	14250.5
2000	-7	-.0079	419.9	381.7	440.3	7779.3	7618.7	7865.2	18527.0	19958.1	17862.5
2010	-251	-.2134	428.0	377.3	455.5	10258.5	10366.5	10199.8	23367.8	27472.4	22390.1
2020	-636	-.4816	434.0	366.2	472.5	13479.9	13850.2	13268.4	31055.7	37815.8	28065.3

the income gap closes in the simulation is shown in figure 2. Employment targets for the year 2000 were set to have the employment-population ratio in the rural sector equal to the trend projection for the urban sector (437 workers per 1,000 population) (table 2). The time path over which the employment-population ratio closes in the simulation is shown in figure 3.

The major change in the parameter values required to reach the specified targets for the year 2000 was a virtual doubling of the capacity of the rural sector to absorb idle workers, with little change in the rate of gain in output per worker (table 9). This suggests that of the alternatives analyzed with the simple, seven-equation system, expanding demand for employment in rural America is the most promising policy for rural development. About 8.8 million more new jobs than are expected from current trends are required in the rural sector to reach these targets (table 10). About 3.7 million of these would be transfers of jobs that would have been located in the urban-oriented areas according to present trends. The remaining 5.1 million jobs are not now in prospect, but would have to be created to utilize the available skills of the underemployed labor force in the rural-oriented areas. The magnitude of this number of new jobs may be alternatively expressed as around 170,000 new jobs a year above trend over the next 30 years.

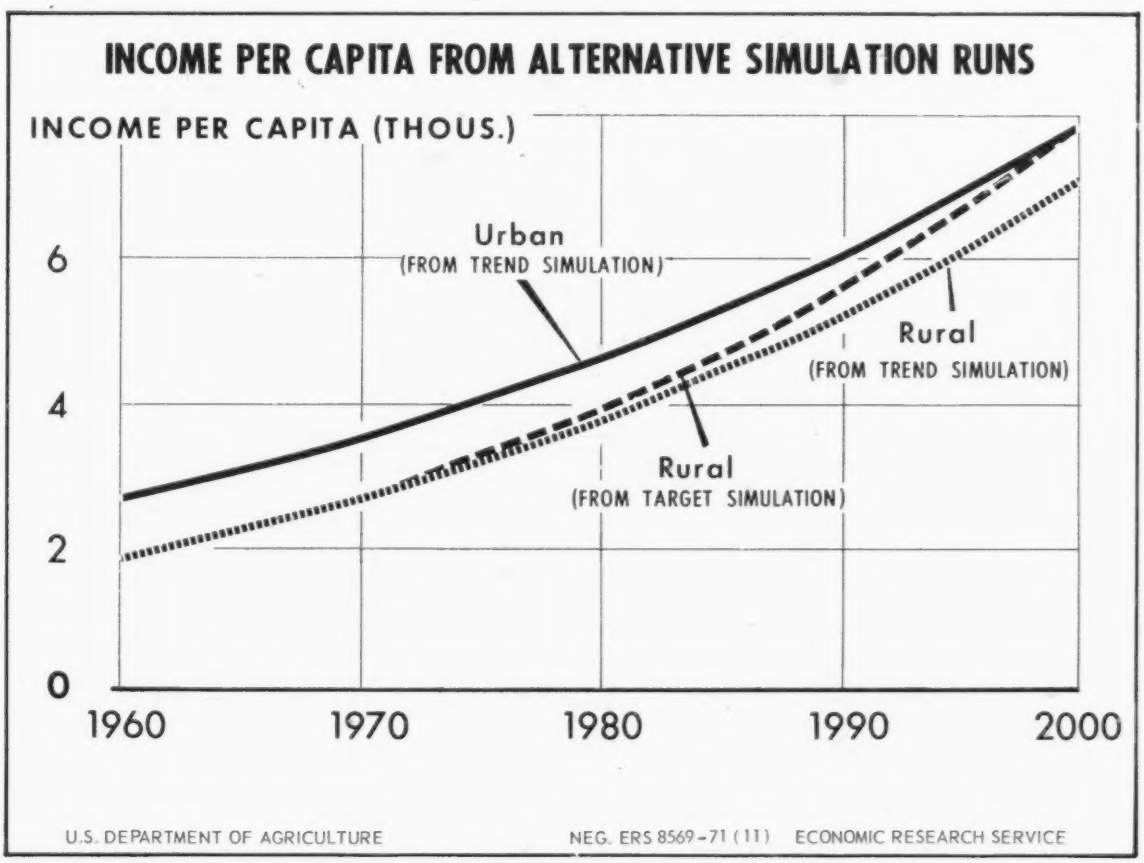

FIGURE 2

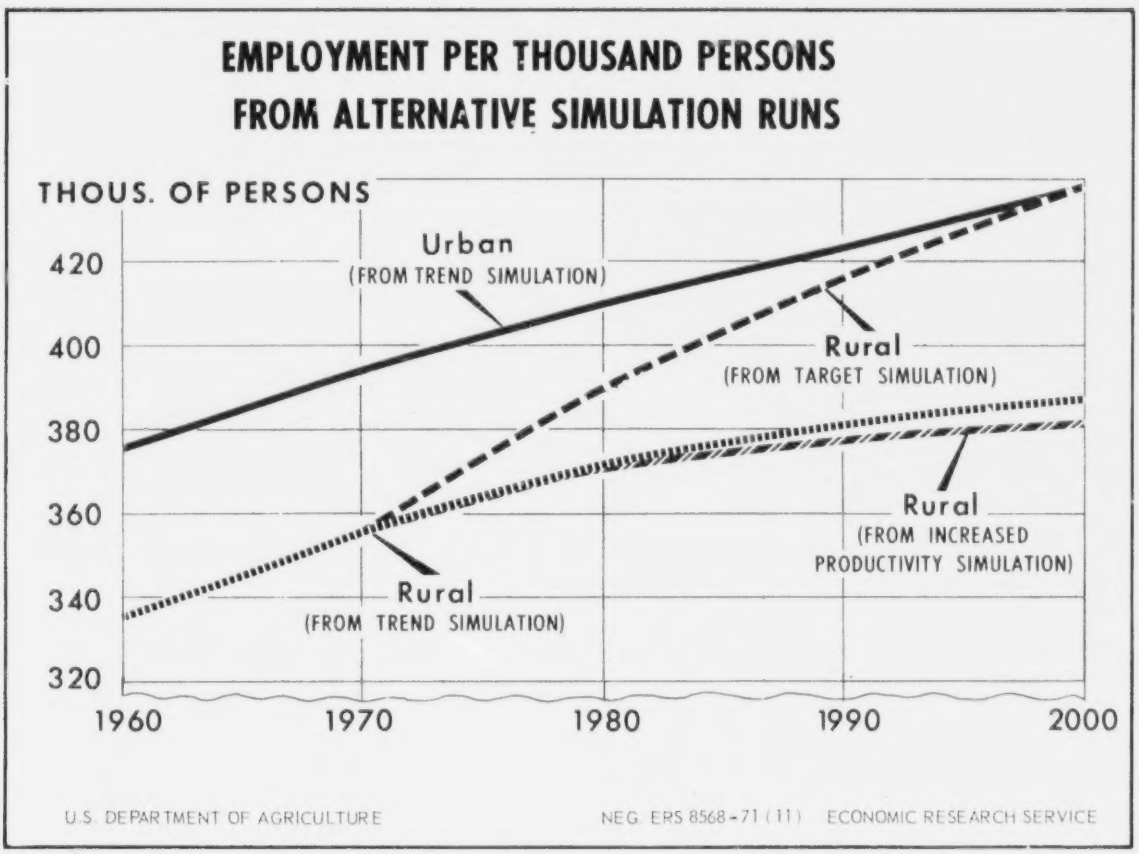

FIGURE 3

A second indication of the target run is that continual overt efforts must be made to maintain the rate of gain in output per person in rural areas above that in urban areas. This effort includes upgrading the quality of the labor force in rural areas as well as that of the jobs there.

Thirdly, policymakers need not look askance at some moderate reduction in the natural rate of increase in the population of rural areas, although overt efforts to make this a major objective of development policies appear counter-productive. Stopping outmigration as a natural complement to the development policies discussed might be considered desirable; but employing overt migration policies to achieve development ends appears unwarranted and ineffectual. Stopping outmigration may be a worthy end of rural development policies, but it is not an efficient means. In short, a comprehensive development plan would emphasize aggregate demand and productivity factors and minimize the use of direct demographic policies to help redistribute a portion of the population to achieve the overall development goals.

TABLE 9.--RESULTS OF TARGET-RUN SIMULATION, 1970-2020

NATURAL POPULATION GROWTH RATE = .012570 9(RURAL) .012570 9(URBAN) MIGRATION COEFFICIENTS:
COEFFICIENT OF DEMAND FOR EMPLOYMENT = .012700 6(RURAL) .011252 4(URBAN) EMPLOYMENT DEMAND= .00
INCOME GROWTH RATE= .028659 3(RURAL) .022847 9(URBAN) INCOME-EMPLOYMENT RATIOS = .000000 0
NUMBER OF YEARS= 51 EMPLOYMENT-POPULATION RATIOS = .0000

	POPULATION(THOU.)			EMPLOYMENT(THOU.)			INCOME($MIL.)			POPULATION PROPORTION		EMPLOYMENT PROPORTION		INCOME PROPORTION	
YEAR	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
1970	203184	75944	127640	77265	26900	50365	6626 29	2058 38	4567 91	.3718	.6282	.3748 2	.6518	.3106	.6894
1980	230221	85596	144625	93031	33400	59631	10169 37	3390 32	6779 05	.3718	.6282	.3590	.6410	.3334	.6666
1990	260855	96986	163869	110271	40415	69855	15396 10	5441 89	9954 21	.3718	.6282	.3665	.6335	.3535	.6465
2000	295565	109891	185674	129251	48055	81195	23086 07	8583 40	14502 67	.3718	.6282	.3718	.6282	.3718	.6282
2010	334895	124514	210381	150266	56440	93825	34379 03	13372 82	21006 20	.3718	.6282	.3756	.6244	.3890	.6110
2020	379457	141082	238375	173643	65702	107940	50942 10	20650 45	30291 64	.3718	.6282	.3784	.6216	.4054	.5946

YEAR	MIGRATION RURAL-TO-URBAN THOU.	MIGRATION RURAL-TO-URBAN PERCENT	EMPLOYMENT PER 1000 POP. TOTAL	EMPLOYMENT PER 1000 POP. RURAL	EMPLOYMENT PER 1000 POP. URBAN	INCOME PER CAPITA TOTAL	INCOME PER CAPITA RURAL	INCOME PER CAPITA URBAN	INCOME PER EMPLOYEE TOTAL	INCOME PER EMPLOYEE RURAL	INCOME PER EMPLOYEE URBAN
1970	0	.0000	380.3	356.1	394.6	3261.7	2725.2	3579.2	8576.5	7652.4	9070.0
1980	0	.0000	404.1	390.2	412.3	4417.7	3961.3	4687.8	10931.6	10150.9	11368.8
1990	0	.0000	422.7	416.7	426.3	5902.7	5611.5	6075.0	13962.5	13465.3	14250.2
2000	0	.0000	437.3	437.3	437.3	7811.3	7811.3	7811.3	17861.9	17861.9	17861.9
2010	0	.0000	448.7	453.3	446.0	10266.1	10740.5	9985.3	22879.3	23694.1	22389.1
2020	0	.0000	457.6	465.7	452.8	13425.5	14637.7	12708.0	29337.7	31430.7	28063.7

Table 10.--Absolute changes from expected trend, assuming various alternative policy actions for 3 selected years 1/

Policy action and year	Population			Employment			Income		
	U.S.	Rural	Urban	U.S	Rural	Urban	U.S.	Rural	Urban
	Thousands						Million dollars		
Stop rural out-migration:									
1980	0	2,903	-2,903	-60	96	-155	-784	982	-1,766
1990	0	5,830	-5,830	-238	399	-636	-3,606	5,462	-9,069
2000	0	8,502	-8,502	-507	888	-1,394	-8,660	16,250	-24,910
Double rural out-migration:									
1980	0	-2,568	2,568	55	-89	144	727	-911	1,638
1990	0	-4,612	4,612	202	-341	544	3,075	-4,673	7,748
2000	0	-6,103	6,103	401	-706	1,108	6,848	-12,946	19,794
Reduce rural birth rate:									
1980	-1,649	-1,590	-59	-54	-52	-2	-552	-531	-22
1990	-3,645	-3,400	-246	-241	-223	-17	-3,301	-3,053	-248
2000	-6,061	-5,508	-553	-583	-523	-59	-10,649	-9,583	-1,066
Increase rural birth rate:									
1980	1,679	1,620	59	54	53	2	559	536	23
1990	3,781	3,539	241	246	229	18	3,378	3,130	248
2000	6,401	5,864	537	604	545	59	11,027	9,982	1,045
Expand rural aggregate demand for workers:									
1980	0	1,016	-1,016	2,264	2,314	-50	23,119	23,683	-564
1990	0	2,520	-2,520	4,438	4,678	-239	60,632	64,046	-3,414
2000	0	4,466	-4,466	6,586	7,194	-608	120,883	131,743	-10,860
Raise productivity of rural labor force:									
1980	0	112	-112	-2	2	-3	9,110	9,149	-39
1990	0	589	-589	-14	23	-37	27,876	28,406	-530
2000	0	1,694	-1,694	-57	97	-153	63,658	66,403	-2,745
Target income and employment:									
1980	0	2,902	-2,902	1,770	2,701	-930	14,218	24,802	-10,584
1990	0	5,830	-5,830	3,450	5,628	-2,178	36,826	67,887	-31,060
2000	0	8,502	-8,502	5,094	8,803	-3,709	73,124	139,428	-66,304

1/ Difference may not concur because of rounding.

APPENDIX

This report utilizes data that are available on a county basis to build the rural and urban sectors. Four different approaches were tested in allocating the 3,136 counties of the United States into either a rural or an urban delineation. In some of the delineations, places that seem fairly rural in character fall in the urban category; the opposite occurs in other delineations. The major advantages, limitations, and rationale behind each of the four approaches are discussed briefly below. Then a comparison is made of the simulation results obtained from each delineation. Each delineation leads to the same general conclusions about the rural-urban prospects for population, income, and employment.

I. Standard Metropolitan Statistical Areas

The Office of Management and Budget has designated certain counties (or, in the case of New England, towns) as Standard Metropolitan Statistical Areas (SMSA's). An SMSA must contain at least one central city of at least 50,000 inhabitants. The SMSA will then include the county in which this central city is located, plus adjacent counties found to be metropolitan in character and economically and socially integrated with the county of the central city. The Bureau of the Census has applied the same definition to New England counties to form Metropolitan State Economic Areas (MESA's). Applying both of these designations to the 3,136 U.S. counties identifies 15 percent as metropolitan in character and 85 percent as rural in character.

An advantage of this SMSA/non-SMSA delineation is that it is becoming increasingly popular in the rural development literature, probably because a considerable amount of economic and social data are published on an SMSA/non-SMSA basis. Also, this delineation is based on fairly stable county lines, in contrast to changing city boundaries used in the conventional census definition of urban.

A major shortcoming of this delineation is that counties adjacent to or near the county with the central city and not metropolitan in character are not included in the SMSA. Frequently, however, such nearby counties may be an integral part of the central city's larger functional trading and commuting network. People may cross county lines to work, shop, go to school, obtain health care, and find recreation.

II. Urban Orientation of Counties

A two-dimensional criterion was used by Bluestone for identifying the urban orientation of counties for purposes of area development analysis.1/ According to Bluestone, a county's urban orientation is reflected in the

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1/ Bluestone, Herman. Focus for Area Development Analysis: Urban Orientation of Counties, U.S. Dept. of Agr., Econ. Res. Serv., Agr. Econ. Rpt. 183, May 1970, pp. 1-4.

percentage of the county's population that lives in urban places (primarily places of 2,500 or more) as well as by the density of the population per square mile. Bluestone allocated counties into six urban-orientation classes. However, for purposes of the present study, only two classes are desired. Following Bluestone, we designate a county as urban in character when either (a) at least 50 percent of the county's population live in urban places, or (b) the density exceeds 100 persons per square mile, or (c) both. Applying these designations to the 3,136 U.S. counties identifies 36 percent of the counties as metropolitan in character and 64 percent as rural.

Advantages of using the urban orientation of individual counties to define urban and rural sectors of the United States include: County units are well-understood popularly; county lines are stable over time, which facilitates future analyses; and the method of allocation has been used elsewhere and is easily understood.

Shortcomings to applying the urban-orientation code to build a two-sector economy from counties include a variation of the criticism against the SMSA delineation mentioned above. That is, functional economic trading and commuting areas are broken up when counties containing central cities go into one sector and outlying counties without central cities, but socially and economically interdependent with central cities, go into the other. In addition, the counties categorized as rural in Bluestone's delineation are very sparsely populated--they contain a mere 17 percent of the U.S. population.

III. Urban Orientation of Multicounty Areas Based on Two Dimensions

In our third approach to a rural-urban delineation, we applied Bluestone's two-dimensional criterion for county units to a multicounty breakdown of the United States. This breakdown, which was developed by Nelson and Abel for the purpose of area development analysis, aggregates the 3,136 U.S. counties into 482 multicounty basic economic research areas.2/ The areas are delineated on the basis of population size of the urban center, commuting time to the center, and factors of economic interdependence such as commuting and trading patterns.

A multicounty area was designated as urban oriented when either (a) at least 50 percent of the area's population live in urban places, or (b) the area's density exceeds 100 persons per square mile, or (c) both. As a result, 273 multicounty areas were designated as urban oriented and 209 as rural oriented.

To illustrate this approach: The Knoxville, Tennessee, multicounty area had a population of about three-quarters of a million in 1970. Of these people, 47 percent lived in urban places according to the census definition. There was an average of 97 persons per square mile. Hence, the Knoxville area is classed as rural oriented according to Bluestone's percentage-urban and density

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2/ Nelson, Karen M., and Abel, Fred H. Basic Economic Research Areas: A Delineation and Prospects for Use. U.S. Dept. of Agr., Econ. Res. Serv., 1971, unpublished manuscript.

criteria. On the other hand, the Syracuse, New York, multicounty area, with about the same total 1970 population as the Knoxville area, was 67 percent urban and had 213 persons per square mile; hence, it is classed as urban oriented. Both central cities are Standard Metropolitan Statistical Areas. However, the Tennessee area, including the hinterland counties, is considered in this delineation to be rural oriented, while the Syracuse area is considered urban oriented.

Advantages of using multicounty research areas instead of counties in delineating a rural and an urban sector is that counties that are tied together economically and socially stay together for the analysis. That is, an entire multicounty area, with its central city and its rural hinterland, is categorized as either rural or urban.

A disadvantage of our third approach is that the multicounty areas are not recognized by local residents and leaders as units for which economic policies are made and implemented. An additional disadvantage is that it puts 87 percent of the U.S. population in the urban sector and only 13 percent in the rural sector.

IV. Urban Orientation of Multicounty Areas Based on One Dimension

The fourth rural-urban delineation, and the one discussed in the body of this report, is based on a modification of the delineation discussed immediately above. To overcome the weaknesses of the small size of the rural-oriented sector resulting from that delineation, we considered using only the percentage-urban dimension or only the density dimension.

With only the percentage-urban dimension, only nine multicounty areas would be added to the rural sector, because most of the areas with over 100 people per square mile also have more than 50 percent of the population living in urban places. On the other hand, using only the density dimension reclassifies 174 multicounty areas from urban to rural. This procedure results in 99 areas being categorized as urban oriented and 383 as rural oriented. The delineation used in the body of this report is the latter one in which a multicounty area is classed as rural or urban oriented according to whether the density of the area is less than or greater than 100 persons per square mile.

An advantage of this delineation is that the rural-oriented sector now contains 37 percent of the U.S. population, only moderately more than the 30 percent living outside SMSA's. Also, since it is still based on multicounty areas, the units are relatively closed with respect to work and trade.

A disadvantage is that some highly urban centers end up in the rural-oriented sector. For example, the multicounty area containing Denver is 89 percent urban, but with its vast, sparsely populated hinterland, has only 82 people per square mile. Hence, the Denver area is classified as rural oriented because of the extremely rural character of its hinterland, even though its

central city is recognized as highly metropolitan in character, ranking 27th among all of the SMSA's in 1970 population. The delineation also has the same disadvantage mentioned above for multicounty areas: The multicounty areas are not units for which economic policies are made and implemented.

A Synopsis of Simulation Results From the Alternative Delineations

For each delineation, the nine structural parameters estimated from the 1960-70 data were about the same value. In particular, the income productivity coefficient for the rural sector, b_1, averaged .0325, and that for the urban sector, b_2, averaged .0232. The demand-for-labor coefficient for the rural sector of each delineation averaged .006, while that for the urban sector averaged .012. The population-growth parameters were, by definition, set equal to each other for the rural and urban sectors in all four delineations. This value was set at the national annual rate for 1960-70 or $c_1 = c_2 = 1.26$. Because of the similarities in the parameter values, basic trends in population, income, and employment exhibited the same general patterns over the decades.

The following is a summary of results obtained from simulations based on the four rural-urban delineations. Tables in this appendix show the output from: (1) The SMSA/non-SMSA approach, (2) the urban orientation of counties approach, and (3) the approach based on urban orientation of multicounty areas, where at least 50 percent of the area's population live in urban places, or the density exceeds 100 persons per square mile, or both. Tables from the fourth approach are in the body of this report. They are based on an urban orientation of multicounty areas, applying only the density criterion of 100 persons per square mile.

Basic Trend

The basic-trend run for each delineation is shown in appendix tables A-1, A-2, and A-3 and in text table 2. In all four cases, continued outmigration from the rural sector causes the proportion of the rural population to decline slightly each year, with the larger percentage decrease occurring during the earliest years of the simulation. However, shortly after the year 2000, the direction of the migration flow reversed itself for all runs.

Income remained in almost constant proportions between the rural and urban sectors as the total level rose during 1970-2000 for each of the four delineations. Aggregate income gains due to expanding population and employment in the urban sector were about matched by gains due to rising income and output per worker in the rural sector in each instance. Income per capita continued to be higher in the urban sector than in the rural sector throughout the simulation for all four delineations.

The demand-for-labor coefficients in the urban sectors were found to be almost double those in the rural sectors for all runs. Closing this gap is shown in the sensitivity analysis below to be a most promising policy for rural development.

TABLE A-1.--SIMULATED RESULTS OF PROJECTING NORMAL TRENDS, SMSA/NON-SMSA DELINEATION, 1960-2020

NATURAL POPULATION GROWTH RATE =	.0125710(RURAL)	.0125710(URBAN)	MIGRATION COEFFICIENTS:
COEFFICIENT OF DEMAND FOR EMPLOYMENT=	.0062154(RURAL)	.0123854(URBAN)	EMPLOYMENT DEMAND= 16060.90
INCOME GROWTH RATE=	.0312217(RURAL)	.0226287(URBAN)	INCOME-EMPLOYMENT RATIOS= .0926000
NUMBER OF YEARS= 61			EMPLOYMENT-POPULATION RATIOS= 2462.7000

YEAR	POPULATION(THOU.) TOTAL	RURAL	URBAN	EMPLOYMENT(THOU.) TOTAL	RURAL	URBAN	INCOME($MIL.) TOTAL	RURAL	URBAN	POPULATION PROPORTION RURAL	URBAN	EMPLOYMENT PROPORTION RURAL	URBAN	INCOME PROPORTION RURAL	URBAN
1960	179323	58948	120374	64639	19695	44943	432360	105234	327126	.3287	.6713	.3047	.6953	.2434	.7566
1970	203184	62852	140332	77265	22196	55069	662630	161283	501346	.3093	.6907	.2873	.7127	.2434	.7566
1980	230221	67447	162773	91319	24801	66518	1002515	245077	757437	.2930	.7070	.2716	.7284	.2445	.7555
1990	260855	73049	187806	106991	27554	79436	1501666	370287	1131378	.2800	.7200	.2575	.7425	.2466	.7534
2000	295566	80132	215434	124482	30519	93963	2231639	557765	1673874	.2711	.7289	.2452	.7548	.2499	.7501
2010	334896	89419	245476	144003	33793	110209	3295535	839890	2455644	.2670	.7330	.2347	.7653	.2549	.7451
2020	379458	102014	277444	165758	37519	128239	4842068	1268125	3573943	.2688	.7312	.2263	.7737	.2619	.7381

YEAR	MIGRATION RURAL-TO-URBAN THOU.	PERCENT	EMPLOYMENT PER 1000 POP. TOTAL	RURAL	URBAN	INCOME PER CAPITA TOTAL	RURAL	URBAN	INCOME PER EMPLOYEE TOTAL	RURAL	URBAN
1960	375	.6361	360.5	334.1	373.4	2411.6	1785.7	2718.1	6689.3	5343.5	7279.1
1970	366	.5823	380.3	353.2	392.4	3261.7	2566.6	3573.1	8576.5	7266.7	9104.4
1980	339	.5031	396.7	367.7	408.7	4355.1	3634.1	4653.8	10978.6	9882.1	11387.4
1990	285	.3919	410.2	377.2	423.0	5757.2	5069.5	6024.7	14035.9	13439.0	14243.0
2000	193	.2403	421.2	380.9	436.2	7550.9	6961.0	7770.3	17927.8	18276.0	17814.7
2010	36	.0401	430.0	377.9	449.0	9841.0	9393.2	10004.1	22885.7	24854.2	22282.1
2020	-216	-.2132	436.8	367.8	462.2	12761.0	12431.3	12882.2	29212.0	33800.0	27869.7

TABLE A-2.--SIMULATED RESULTS OF PROJECTING NORMAL TRENDS, URBAN ORIENTATION OF COUNTIES DELINEATION, 1960-2020

NATURAL POPULATION GROWTH RATE = .012571O(RURAL) .0125710(URBAN)
COEFFICIENT OF DEMAND FOR EMPLOYMENT= .0043702(RURAL) .0117139(URBAN)
INCOME GROWTH RATE= .034648I(RURAL) .023352O(URBAN)
NUMBER OF YEARS= 51

MIGRATION COEFFICIENTS:
EMPLOYMENT DEMAND= 11858.00
INCOME-EMPLOYMENT RATIOS= .0715590
EMPLOYMENT-POPULATION RATIOS= 2016.8000

	POPULATION(THOU.)			EMPLOYMENT(THOU.)			INCOME($MIL.)			POPULATION PROPORTION		EMPLOYMENT PROPORTION		INCOME PROPORTION	
YEAR	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
1960	179323	33450	145872	64639	10910	53728	432360	52995	379364	.1865	.8135	.1688	.8312	.1226	.8774
1970	203184	34443	168740	77265	11899	65366	662629	81253	581376	.1695	.8305	.1540	.8460	.1226	.8774
1980	230221	35770	194451	91329	12894	78435	1002527	123773	878753	.1554	.8446	.1412	.8588	.1235	.8765
1990	260855	37724	223131	107018	13914	9@104	1501707	187766	1313940	.1446	.8554	.1300	.8700	.1250	.8750
2000	295566	40751	254815	124526	14993	109533	2231602	284437	1947164	.1379	.8621	.1204	.8796	.1275	.8725
2010	334896	45555	289340	144047	16188	127859	3294846	431724	2863121	.1360	.8640	.1124	.8876	.1310	.8690
2020	379458	53281	326177	165759	17589	148169	4838894	659474	4179420	.1404	.8596	.1061	.8939	.1363	.8637

YEAR	MIGRATION RURAL-TO-URBAN THOU.	MIGRATION RURAL-TO-URBAN PERCENT	EMPLOYMENT PER 1000 POP. TOTAL	EMPLOYMENT PER 1000 POP. RURAL	EMPLOYMENT PER 1000 POP. URBAN	INCOME PER CAPITA TOTAL	INCOME PER CAPITA RURAL	INCOME PER CAPITA URBAN	INCOME PER EMPLOYEE TOTAL	INCOME PER EMPLOYEE RURAL	INCOME PER EMPLOYEE URBAN
1960	330	.9858	360.5	326.2	368.3	2411.6	1584.8	2601.2	6689.3	4857.6	7061.3
1970	319	.9273	380.3	345.5	387.4	3261.7	2359.5	3445.3	8576.5	6828.7	8894.7
1980	288	.8062	396.7	360.5	403.4	4355.1	3460.7	4519.6	10977.5	9599.6	11204.0
1990	229	.6069	410.3	368.8	417.3	5757.3	4977.8	5889.1	14032.7	13495.1	14113.0
2000	127	.3105	421.3	367.9	429.9	7550.8	6980.3	7642.0	17921.1	18971.3	17777.4
2010	-43	-.0975	430.1	355.3	441.9	9838.9	9477.3	9395.8	22873.8	26669.9	22393.2
2020	-326	-.6138	436.8	330.1	454.3	12752.6	12377.8	12813.8	29192.8	37492.6	28207.5

TABLE A-3.--SIMULATED RESULTS OF PROJECTING NORMAL TRENDS, 482 MULTICOUNTY AREAS, DELINEATION USING BOTH DENSITY AND URBAN CRITERIA, 1960-2020

NATURAL POPULATION GROWTH RATE =	.0125710(RURAL)	.0125710(URBAN)	MIGRATION COEFFICIENTS:
COEFFICIENT OF DEMAND FOR EMPLOYMENT=	.0042909(RURAL)	.0113625(URBAN)	EMPLOYMENT DEMAND= 9747.00
INCOME GROWTH RATE=	.0348008(RURAL)	.0238009(URBAN)	INCOME-EMPLOYMENT RATIOS= .0729700
NUMBER OF YEARS= 61			EMPLOYMENT-POPULATION RATIOS= 1676.7000

	POPULATION(THOU.)			EMPLOYMENT(THOU.)			INCOME($MIL.)			POPULATION		EMPLOYMENT		INCOME	
										----------PROPORTION----------					
YEAR	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
1960	179323	25851	153471	64639	8432	56206	432360	43096	389264	.1442	.8558	.1305	.8695	.0997	.9003
1970	203184	26523	176661	77267	9180	68086	662643	66057	596585	.1305	.8695	.1188	.8812	.0997	.9003
1980	230221	27584	202636	91294	9931	81362	1002577	100614	901962	.1198	.8802	.1088	.8912	.1004	.8996
1990	260855	29352	231503	106902	10708	96193	1501907	152734	1349173	.1125	.8875	.1002	.8998	.1017	.8983
2000	295566	32315	263251	124279	11548	112731	2232298	231889	2000408	.1093	.8907	.0929	.9071	.1039	.8961
2010	334896	37264	297631	143607	12512	131095	3296908	353719	2943189	.1113	.8887	.0871	.9129	.1073	.8927
2020	379458	45512	333946	165050	13701	151348	4844299	545335	4298963	.1199	.8801	.0830	.9170	.1126	.8874

	MIGRATION		EMPLOYMENT PER 1000 POP.			INCOME PER CAPITA			INCOME PER EMPLOYEE		
YEAR	RURAL-TO-URBAN		TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN
	THOU.	PERCENT									
1960	269	1.0386	360.5	326.2	366.2	2411.6	1667.6	2536.9	6689.3	5111.3	6926.1
1970	249	.9392	380.3	346.1	385.4	3261.8	2491.0	3377.5	8576.5	7196.0	8752.8
1980	208	.7546	396.5	360.1	401.5	4355.3	3648.0	4451.6	10982.3	10130.9	11096.3
1990	137	.4655	409.8	364.8	415.5	5758.1	5203.9	5828.4	14049.8	14263.0	14026.1
2000	17	.0537	420.5	357.4	428.2	7553.1	7176.3	7599.4	17962.4	20080.5	17745.5
2010	-179	-.4835	428.8	335.8	440.5	9845.1	9492.5	9889.2	22958.3	28270.8	22451.2
2020	-507	-1.1153	435.0	301.0	453.2	12766.8	11982.7	12877.7	29351.0	39801.9	28404.9

Sensitivity Analysis

The alternative development policies discussed in the body of this report were simulated for all four delineations. Results of the simulated policies are discussed briefly below. Appendix tables A-4, A-5, and A-6 and text table 1 present a summary of the outputs as of the year 2000, with comparisons to the 1960 and 1970 initial conditions and to the year 2000 for the trend run.

Migration Effects.--Outmigration from the rural sector was analyzed under two situations. First, the migration coefficient for each delineation was set to zero, meaning no rural outmigration. As a result, the rural sector's population increased considerably above trend by the year 2000. The consequences for income and employment were about the same for each delineation. Total income in the rural sector gained, but work force participation rates among rural inhabitants dropped. An increase in per capita income in the urban sector ranged from $114 to $268 at the expense of reduced per capita income in the rural sector.

The second migration policy was a doubling of the migration coefficients. For each delineation, this action resulted in, by the year 2000, a considerable rise in per capita income and higher employment-population ratios in the rural sector. Benefits to rural individuals from this policy are at the expense of reduced total business activity in the rural sector. Also, employment per 1,000 persons is lower in the urban sector and income per capita there is reduced.

Population Growth Rates.--Rural population growth rates were reduced from 1.26 to 1.06 for each delineation. The results of each run show a reduced rural population by the year 2000 and a slight rise in rural per capita income. A run with the rural population growth rate increased to 1.46 resulted in an increase in total national income but a decrease in per capita income in both the rural and urban sectors.

Labor Productivity Increases.--To assess the effects of increased labor productivity on each delineation's rural sector, the rural labor productivity coefficient, b_1, was increased 10 percent. For all four delineations, results indicate higher rural per capita incomes and higher employment-population ratios than in the trend run. Also, reversed rural outmigration begins 10 to 20 years earlier than trend, depending on the definition of rural.

Labor Demand Expansion.--The rural demand-for-labor coefficient, a_1, was made equal to that of the urban sector for all delineations. This meant an almost doubling of the rural coefficients. By the year 2000: Rural per capita income exceeds urban per capita income; the gap between employment-population ratios in the rural and urban sectors closes considerably; rural outmigration is reversed at least 10 years earlier than trend; and total U.S. business activity is up. The latter rise comes as a result of a considerable increase in rural economic activity but is at the expense of a decline in the economic activity of the urban sector.

Target Run.--The target run sets two goals to be accomplished by the year 2000: (1) To raise rural per capita income so that it equals the trend

Table A-4.--Summary projections of simulated alternative development policies, SMSA/non-SMSA delineation, 1960-2000

Simulated alternatives	Year	Source: table No. 1/	Annual population growth rate 2/		Migrants		Income per capita	
			Rural	Urban	Rural to Urban		Rural	Urban
			----Percent--------		Thou.	Pct.	-------Dollars 3/----	
Initial conditions.....	1960	A-1	-	-	375	.64	1,786	2,718
Initial conditions.....	1970	A-1	.64	1.54	366	.58	2,567	3,573
Trend run.....	2000	A-1	.81	1.44	193	.24	6,961	7,770
Stop rural outmigration.....	2000	-	1.25	1.26	0	0	6,296	8,038
Double rural outmigration inducements.....	2000	-	.51	1.55	215	.29	7,451	7,632
Reduce rural birth rate.....	2000	-	.63	1.43	154	.20	7,264	7,789
Increase rural birth rate...	2000	-	1.00	1.45	229	.27	6,669	7,752
Expand rural aggregate demand for workers.....	2000	-	1.07	1.34	-39	-.05	8,112	7,930
Raise productivity of rural labor force.....	2000	-	.88	1.41	55	.07	7,486	7,818
Target run.....	2000	A-7	1.26	1.26	0	0	7,771	7,771
			Distribution of--					
			Population		Employment		Income	
			Rural	Urban	Rural	Urban	Rural	Urban
			----------Percent----------					
Initial conditions.....	1960	A-1	33	67	30	70	24	76
Initial conditions.....	1970	A-1	31	69	29	71	24	76
Trend run.....	2000	A-1	27	73	25	75	25	75
Stop rural outmigration....	2000	-	31	69	25	75	26	74
Double rural outmigration inducements.....	2000	-	25	75	24	76	24	76
Reduce rural birth rate....	2000	-	26	74	24	76	25	75
Increase rural birth rate..	2000	-	28	72	25	75	25	75
Expand rural aggregate demand for workers.....	2000	-	29	71	29	71	30	70
Raise productivity of rural labor force.....	2000	-	28	72	25	75	27	73
Target run.....	2000	A-7	31	69	31	69	31	69

1/ Refers to other tables in this report. 2/ Rates are annual average rates for 1970-2000, except for row 2, where the rate is the 1960-70 average. Rates are adjusted to accommodate migration effects.
3/ Constant, 1970 dollars.

Table A-5.--Summary projections of simulated alternative development policies, urban orientation of counties delineation, 1960-2000

Simulated alternatives	Year	Source: Table No. 1/	Annual population growth rate 2/		Migrants		Income Per capita	
			Rural	Urban	Rural to Urban		Rural	Urban
			----Percent----		Thou.	Pct.	------Dollars 3/----	
Initial conditions.....	1960	A-2	-	-	330	.99	1,585	2,601
Initial conditions.....	1970	A-2	.29	1.47	319	.93	2,360	3,446
Trend run.....	2000	A-2	.56	1.38	127	.31	6,980	7,642
Stop rural outmigration....	2000	-	1.26	1.26	0	0	5,901	7,825
Double rural outmigration inducements.....	2000	-	.15	1.45	83	.23	7,700	7,568
Reduce rural birth rate....	2000	-	.39	1.38	96	.25	7,283	7,655
Increase rural birth rate..	2000	-	.74	1.39	156	.36	6,686	7,629
Expand rural aggregate demand for workers.....	2000	-	1.00	1.31	-79	-.17	8,237	7,762
Raise productivity of rural labor force.....	2000	-	.67	1.36	9	.02	7,485	7,675
Target run.....	2000	A-8	1.26	1.26	0	0	7,642	7,642
			Distribution of--					
			Population		Employment		Income	
			Rural	Urban	Rural	Urban	Rural	Urban
			----------Percent----------					
Initial conditions.....	1960	A-2	19	81	17	83	12	88
Initial conditions.....	1970	A-2	17	83	15	85	12	88
Trend run.....	2000	A-2	14	86	12	88	13	87
Stop rural outmigration....	2000	-	17	83	13	87	13	87
Double rural outmigration inducements.....	2000	-	12	88	12	88	12	88
Reduce rural birth rate....	2000	-	13	87	12	88	13	87
Increase rural birth rate..	2000	-	14	86	12	88	14	86
Expand rural aggregate demand for workers.....	2000	-	16	84	16	84	16	84
Raise productivity of rural labor force.....	2000	-	14	86	12	88	14	86
Target run.....	2000	A-8	17	83	17	83	17	83

1/ Refers to other tables in this report. 2/ Rates are annual average rates for 1970-2000 except for row 2, where the rate is the 1960-70 average. Rates are adjusted to accommodate migration effects.

Table A-6.--Summary projections of simulated alternative development policies, 482 multicounty areas, delineation using both density and urban criteria, 1960-2000

Simulated alternatives	Year	Source: table No. 1/	Annual population growth rate 2/		Migrants		Income per capita	
			Rural	Urban	Rural to Urban		Rural	Urban
			-----Percent-------		Thou.	Pct.	-----Dollars 3/---	
Initial conditions	1960	A-3	-	-	269	1.04	1,668	2,537
Initial conditions	1970	A-3	.27	1.41	249	.94	2,491	3,377
Trend run	2000	A-3	.66	1.34	17	.05	7,176	7,599
Stop rural outmigration	2000	-	1.26	1.26	0	0	6,221	7,713
Double rural outmigration inducements	2000	-	.34	1.38	-62	-.22	7,717	7,558
Reduce rural birth rate	2000	-	.50	1.33	-5	-.02	7,471	7,610
Increase rural birth rate	2000	-	.83	1.34	41	.12	6,879	7,589
Expand rural aggregate demand for workers	2000	-	1.09	1.28	-146	-.40	8,430	7,692
Raise productivity of rural labor force	2000	-	.81	1.32	-109	-.32	7,611	7,635
Target run	2000	A-9	1.26	1.26	0	0	7,600	7,600
			Distribution of--					
			Population		Employment		Income	
			Rural	Urban	Rural	Urban	Rural	Urban
			----------Percent----------					
Initial conditions	1960	A-3	14	86	13	87	10	90
Initial conditions	1970	A-3	13	87	12	88	10	90
Trend run	2000	A-3	11	89	9	91	10	90
Stop rural outmigration	2000	-	13	87	10	90	11	89
Double rural outmigration inducments	2000	-	10	90	9	91	10	90
Reduce rural birth rate	2000	-	11	89	9	91	10	90
Increase rural birth rate	2000	-	11	89	9	91	10	90
Expand rural aggregate demand for workers	2000	-	12	88	12	88	13	87
Raise productivity of rural labor force	2000	-	11	89	9	91	11	89
Target run	2000	A-9	13	87	13	87	13	87

1/ Refers to other tables in this report. 2/ Rates are annual average rates for 1970-2000 except for row 2, where the rate is the 1960-70 average. Rates are adjusted to accommodate migration effects.

projection for the urban sector, and (2) to equalize employment-population ratios within the two sectors. Parameters to achieve these objectives were obtained by allowing the demand-for-labor and income productivity coefficients to vary sufficiently to generate the per capita income and work participation constraints stated above. Population growth parameters for both sectors were held at the national rate. No outmigration occurs under these assumptions.

The target runs are shown in appendix tables A-7, A-8, and A-9 and in text table 9. For each target run, the major impact on the coefficient adjustment process occurs on the rural demand-for-labor coefficient, a_1. The general implication of the output from each run is about the same--between 5 and 9 million additional rural jobs are needed by the year 2000, depending on the definition of rural. This goal can be reached by a virtual doubling of the capacity of the rural sector to create jobs for idle workers. Approximately 3 to 5 million of these jobs could come from a transfer of urban jobs to the rural sector; however, a significant number of new jobs also must be created if the stated goals are to be met in 30 years.

TABLE A-7.--RESULTS OF TARGET-RUN SIMULATION, SMSA/NON-SMSA DELINEATION, 1970-2020

NATURAL POPULATION GROWTH RATE = .01257099 (RURAL) .01257099 (URBAN)
COEFFICIENT OF DEMAND FOR EMPLOYMENT = .01271986 (RURAL) .01125098 (URBAN)
INCOME GROWTH RATE = .03034211 (RURAL) .02262766 (URBAN)
NUMBER OF YEARS = 51

MIGRATION COEFFICIENTS:
EMPLOYMENT DEMAND= .00
INCOME-EMPLOYMENT RATIOS = .00000000
EMPLOYMENT-POPULATION RATIOS = .0000

YEAR	POPULATION (THOU.) TOTAL	RURAL	URBAN	EMPLOYMENT (THOU.) TOTAL	RURAL	URBAN	INCOME ($MIL.) TOTAL	RURAL	URBAN	POPULATION PROPORTION RURAL	URBAN	EMPLOYMENT PROPORTION RURAL	URBAN	INCOME RURAL	URBAN
1970	203184	62853	140331	77265	22196	55069	6626.29	1612.84	5013.45	.3093	.6907	.2873	.7127	.2434	.7566
1980	230221	71217	159004	92921	27634	65287	10141.69	2707.51	7434.18	.3093	.6907	.2974	.7026	.2670	.7330
1990	260855	80693	180161	110053	33497	76556	15328.69	4425.33	10903.31	.3093	.6907	.3044	.6956	.2887	.7113
2000	295565	91431	204134	128926	39877	89048	22966.39	7103.65	15862.73	.3093	.6907	.3093	.6907	.3093	.6907
2010	334895	103597	231297	149932	46876	102956	34198.71	11259.47	22939.23	.3093	.6907	.3129	.6871	.3292	.6708
2020	379457	117382	262075	173096	54602	118494	50706.17	17684.51	33021.65	.3093	.6907	.3154	.6846	.3488	.6512

YEAR	MIGRATION RURAL-TO-URBAN THOU.	PERCENT	EMPLOYMENT PER 1000 POP. TOTAL	RURAL	URBAN	INCOME PER CAPITA TOTAL	RURAL	URBAN	INCOME PER EMPLOYEE TOTAL	RURAL	URBAN
1970	0	.0000	380.3	353.1	392.4	3261.7	2566.5	3573.1	8576.5	7266.7	9104.4
1980	0	.0000	403.6	388.0	410.6	4405.7	3802.3	4676.0	10914.7	9798.2	11387.3
1990	0	.0000	421.9	415.1	424.9	5876.8	5484.6	6052.5	13928.8	13211.6	14242.7
2000	0	.0000	436.2	436.2	436.2	7770.8	7769.9	7771.2	17814.1	17814.1	17814.1
2010	0	.0000	447.4	452.5	445.1	10212.3	10869.0	9918.1	22825.2	24020.1	22281.1
2020	0	.0000	456.2	465.2	452.1	13363.3	15066.2	12600.6	29290.1	32398.3	27868.3

TABLE A-8.--RESULTS OF TARGET-RUN SIMULATION, URBAN ORIENTATION OF COUNTIES DELINEATION, 1970-2020

NATURAL POPULATION GROWTH RATE = .012570 9(RURAL) .012570 9(URBAN) MIGRATION COEFFICIENTS:
COEFFICIENT OF DEMAND FOR EMPLOYMENT= .012509 8(RURAL) .010951 9(URBAN) EMPLOYMENT DEMAND= .00
INCOME GROWTH RATE= .032407 4(RURAL) .023507 (URBAN) INCOME-EMPLOYMENT RATIOS= .0000000
NUMBER OF YEARS= 51 EMPLOYMENT-POPULATION RATIOS= .0000

	POPULATION(THOU.)			EMPLOYMENT(THOU.)			INCOME($MIL.)			POPULATION PROPORTION		EMPLOYMENT PROPORTION		INCOME	
YEAR	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
1970	203184	34443	168740	77265	11899	65366	662629	81253	581376	.1695	.8305	.1540	.8460	.1226	.8774
1980	230221	39027	191194	92295	14864	77430	1007113	139626	867486	.1695	.8305	.1611	.8389	.1386	.8614
1990	260855	44220	216635	108810	18050	90749	1514052	233377	1280675	.1695	.8305	.1660	.8340	.1541	.8459
2000	295565	50104	245461	127063	21537	105526	2258716	382859	1875856	.1695	.8305	.1695	.8305	.1695	.8305
2010	334895	56771	278123	147337	25350	121987	3351413	619924	2731488	.1695	.8305	.1721	.8279	.1850	.8150
2020	379457	64325	315132	169945	29558	140386	4954008	994371	3959637	.1695	.8305	.1739	.8261	.2007	.7993

YEAR	MIGRATION RURAL-TO-URBAN THOU.	MIGRATION RURAL-TO-URBAN PERCENT	EMPLOYMENT PER 1000 POP. TOTAL	EMPLOYMENT PER 1000 POP. RURAL	EMPLOYMENT PER 1000 POP. URBAN	INCOME PER CAPITA TOTAL	INCOME PER CAPITA RURAL	INCOME PER CAPITA URBAN	INCOME PER EMPLOYEE TOTAL	INCOME PER EMPLOYEE RURAL	INCOME PER EMPLOYEE URBAN
1970	0	.0000	380.3	345.5	387.4	3261.7	2359.5	3445.9	8576.5	6828.7	8894.7
1980	0	.0000	400.9	380.9	405.0	4375.0	3578.2	4537.7	10912.4	9393.8	11203.9
1990	0	.0000	417.1	408.4	418.9	5804.7	5278.1	5912.2	13915.1	12922.5	14112.7
2000	0	.0000	429.9	429.9	429.9	7642.5	7641.7	7642.7	17776.7	17776.7	17776.7
2010	0	.0000	440.0	446.5	438.6	10007.8	10920.2	9821.6	22746.9	24454.5	22392.1
2020	0	.0000	447.9	459.5	445.5	13056.0	15458.9	12565.5	29151.1	33641.0	28205.7

TABLE A-9.--RESULTS OF TARGET-RUN SIMULATION, 482 MULTICOUNTY AREAS, DELINEATION USING BOTH DENSITY AND URBAN CRITERIA, 1970-2020

NATURAL POPULATION GROWTH RATE = .01 25 70 9 (RURAL) .0 12 57 09 (URBAN)
COEFFICIENT OF DEMAND FOR EMPLOYMENT= .01 23 87 8 (RURAL) .0 10 89 03 (URBAN)
INCOME GROWTH RATE= .03 05 50 5 (RURAL) .0 23 80 58 (URBAN)
NUMBER OF YEARS = 51

MIGRATION COEFFICIENTS:
EMPLOYMENT DEMAND= .0 0
INCOME-EMPLOYMENT RATIOS= .0 00 00 00
EMPLOYMENT-POPULATION RATIOS= .0 0 0 0

	POPULATION (THOU.)			EMPLOYMENT (THOU.)			INCOME ($MIL.)			POPULATION PROPORTION		EMPLOYMENT PROPORTION		INCOME	
YEAR	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	TOTAL	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
1970	203184	26567	176617	7726 5	9181	68084	662629	66064	596565	.1308	.8692	.1188	.8812	.0997	.9003
1980	230221	30102	200119	9212 5	11946	80678	1005715	111285	894430	.1308	.8692	.1293	.8757	.1107	.8893
1990	260855	34107	226747	10884 74	13891	94582	1509174	182469	1326704	.1308	.8692	.1281	.8719	.1209	.8791
2000	295565	38646	256919	12665 61	16553	110008	2246152	293779	1952372	.1308	.8692	.1308	.8692	.1308	.8692
2010	334995	43788	291106	14665 65	19474	127191	3323056	466967	2856088	.1308	.8692	.1328	.8672	.1405	.8595
2020	379457	49615	329842	16690 96	22699	146397	4894743	735420	4159323	.1308	.8692	.1342	.8658	.1502	.8498

YEAR	MIGRATION RURAL-TO-URBAN THOU.	MIGRATION RURAL-TO-URBAN PERCENT	EMPLOYMENT PER 1000 POP. TOTAL	EMPLOYMENT PER 1000 POP. RURAL	EMPLOYMENT PER 1000 POP. URBAN	INCOME PER CAPITA TOTAL	INCOME PER CAPITA RURAL	INCOME PER CAPITA URBAN	INCOME PER EMPLOYEE TOTAL	INCOME PER EMPLOYEE RURAL	INCOME PER EMPLOYEE URBAN
1970	0	.0 0 0	380.3	345.6	385.5	3261.7	2487.2	3378.2	8576.5	7196.0	8762.6
1980	0	.0 0 0	400.7	380.3	403.2	4369.0	3697.4	4470.0	10917.3	9722.4	11086.8
1990	0	.0 0 0	415.8	407.3	417.1	5786.0	5350.3	5851.5	13913.3	13136.0	14027.4
2000	0	.0 0 0	428.2	428.3	428.2	7600.0	7602.3	7599.7	17748.0	17748.0	17748.0
2010	0	.0 0 0	437.9	444.7	436.9	9923.2	10664.6	9811.6	22657.9	23979.5	22455.6
2020	0	.0 0 0	445.6	457.5	443.8	12899.8	14822.9	12610.5	28947.0	32398.9	28411.8